CHAPTER 1. IMPLEMENTING HUD'S TOTAL INFORMATION QUALITY MANAGEMENT ENVIRONMENT

1-1 Overview

A. This chapter presents a definition of information and information quality, HUD's information quality standard, roles and responsibilities, and an overview of HUD's Total Information Quality Management method. The implementation of this method must be in the context of a cultural transformation characterized by:

1. A value system: "we value our information customers."
2. A mindset of "excellence in all our work products including information as a product."
3. A habit of continuous improvement: "to eliminate the waste of process failure and information scrap and rework caused by defective, non-quality data."

1-2 Definition of Information

A. In this Handbook, information refers to data in context. Data is the representation of facts in all media or forms including digital, written, coded, textual, numerical, graphical, geo-spatial, audio and video. Information is the meaning given to data or the interpretation of data based on its context; it is the finished product that results from this interpretation. This document provides a method for total quality management applicable to all information in all forms required by HUD.

B. Based on OMB Section 515 guidance, agencies are directed to develop management procedures for reviewing and substantiating the quality of information before it is disseminated. In Section 515 guidelines, the term information is used primarily in the context of dissemination of information and correction of disseminated information. Given that the method described in this Handbook applies to all kinds of information, disseminated or not, it can be applied to the improvement and correction of all information as needed. This method complements HUD's Section 515 guidelines as follows:

1. **Utility** – the information is usable, supported through the TIQM® quality characteristics of timeliness, concurrency, precision, accessibility, contextual clarity, usability, and rightness.
2. **Objectivity** – the information is being presented in an accurate, clear, complete, and unbiased manner, and as a matter of substance, is accurate, reliable, and unbiased; supported through the TIQM® quality characteristics of accuracy to reality, accuracy to surrogate source, precision, validity, completeness, relationship validity, consistency, concurrency, contextual clarity, usability, derivation integrity and rightness.
3. **Integrity** – the information is protected from corruption or falsification, and is not addressed in this document. For more information on information protection, refer to the HUD Handbook 1750.1 Rev – 4, CHG-3, "National Security Information".

1-3 Definition of Information Quality

A. During the 1990's, Larry English took the proven quality principles of Deming, Shewhart, Crosby and Imai (for a brief discussion of the evolution of quality management refer to Section C.1 below) and adapted them to information management with the same results. Information is a product "manufactured" by one or multiple processes (taking a

loan or a grant application) and consumed by other processes (reporting performance indicators) or customers (public housing authorities).

B. The processes of "manufacturing" (creating and storing, maintaining, propagating and delivering) information have multiple customers, and these customers have multiple needs and expectations that the information product must meet. Information customers can be internal or external. Internal customers are processes and people consuming information to make critical decisions, such as underwriting an application or securing funding for future programs, providing insight into the Department's performance, or servicing the public. External customers include the public, state and local governments, Congress, public service organizations, and the Executive Branch. Customer needs and expectations include documented requirements as well as unwritten expectations.

C. **Information quality means consistently meeting the information customer's expectations.**[2]

D. Improving information quality involves correcting defective data and implementing quality improvement procedures that ensure the expected levels of information quality are achieved and maintained.

E. Information quality has three components:[3]

1. **Data Definition and Information Architecture Quality**: Proper information definition accurately describes the meaning of the real world object or event that the data represents and meets the needs of all information customers to understand the data they use. Proper information architecture correctly represents the structure of the inherent and real relationships of information to represent real-world objects and events and is stable and flexible. Data definition and information architecture are the specification of the information product and must represent the views and needs of all the business areas, applications, and end customers of the information. The data definition and information architecture include the business definition, the domain or value set, and the business rules that govern the data. For a detailed description of information definition and information architecture characteristics, refer to Section 2-3.
2. **Data Content Quality**: Content quality cannot be measured without a quality definition. Data content quality is the degree to which data values accurately represent the characteristics of the real-world object or event and meet the needs of the information customers to perform their jobs effectively. For a detailed description of data content quality characteristics, refer to Figure 2.2.
3. **Data Presentation Quality:** Data presentation quality is the degree to which the information presented enables the knowledge worker or end customer to apply the information efficiently and effectively. Data presentation quality has several dimensions, including accessibility, contextual clarity, usability, and rightness. For a detailed description of information presentation quality characteristics, refer to Figure 2.3.

1-4 HUD Mission-Critical Information Quality Standards

A. HUD must set information quality standards based upon downstream knowledge worker and external stakeholder expectations and requirements for the data. In order to provide the Program Areas with specific and actionable direction, this section describes specific standards for mission-critical information quality, especially information used to support Annual Performance Plans. Each Program Area is encouraged to use this framework to establish information quality standards for other information deemed critical by the Program Area.

B. The three components of information quality must be managed based on the quality class of the information to achieve total information quality. The quality class indicates the degree of quality required for the particular information based on business need. Information quality can be of three classes:

1. Absolute (zero-defect or close to zero-defect) indicates this information can cause significant process failure when containing defects. This includes mission-critical information and may include influential information.
2. Second Tier (high cost of non-quality) indicates there are high costs associated with defects in this information and therefore it is critical to keep defects to a minimum.
3. Third Tier (moderate cost of non-quality) indicates the costs associated with defects in this information are moderate and must be avoided whenever possible. If for some information there is no impact associated with defects, this indicates that the Department may not require the information at all.

C. Figure 1.1 shows HUD's quality standards for mission-critical information, which is of quality class "A".

	Measure	Short Term (12 Month)		Long Term (5 Years)	
		Target	Confidence	Target	Confidence
Definition	% Complete	95%	95%	100%	99%
	Customer Satisfaction	95%	95%	100%	99%
	Known and Acceptable Definition & Structure Defects	95%	95%	100%	99%
Content	Data Correctness (maximum Errors Per Million parts)	3σ (66,810 EPM)	95%	6σ (3.4 EPM)	99%
	Processes Producing Mission-Critical Information in Statistical Control	100%	95%	100%	99%
	Elimination of Known Defect Production (New Defects)Through Information Quality Improvement	50%	N/A	50% (per year)	N/A
Presentation	Accessibility	95%	95%	100%	99%
	Contextual Clarity	95%	95%	100%	99%
	Usability	95%	95%	100%	99%
	Rightness	95%	95%	100%	99%

Figure 1.1: HUD Mission-Critical Information Quality Standards

D. The data content quality standard in Figure 1.1 applies to controllable mission-critical information. Controllable means that HUD has control over the content, because it is collected following HUD standards (e.g., housing authority filings) or produced within HUD. The short and long term targets for data content quality error rates assume the commonly accepted allowance that a process mean could shift by 1.5 standard deviations.

1-5 HUD TIQM® Roles and Responsibilities

A. HUD's Enterprise Data Management (EDM) Policy 3260.1 establishes the roles and responsibilities for

1. **The Data Control Board** (DCB) to direct and facilitate the continuous improvement of information quality at HUD.
2. **The Enterprise Data Management Group** (EDMG) within the OCIO to establish HUD's EDMP in close coordination with the Enterprise Architecture plan and the DCB, and to execute the assessment and certification of mission-critical information.

B. Program Area managers are accountable for the quality of the information produced by the processes and applications in their charge and for ensuring that it meets the needs of all their information customers. Program Area managers are also accountable for the information they collect from their external stakeholders and should work with them to ensure they apply the appropriate information quality management discipline to the information they produce and provide to HUD. It is their responsibility to[4]

1. Implement information policy and ensure compliance,
2. Develop plans consistent with information sharing to maximize reuse and value of information and minimize information costs,
3. Implement information quality design principles and standards that meet all internal and external HUD stakeholders' expectations,
4. Implement effective business rules and provide resources and training to information producers to ensure quality data capture,
5. Provide resources and training to staff in information process improvement (Plan-Do-Check-Act) and empowering staff to improve processes to accomplish quality standards,
6. Present information in reports and screens that minimize ambiguity and maximize the information's objectivity and utility for the information customers.

C. **Program Area Quality Improvement Teams** (PAQIT) and **Correction Teams** (PACT) are ad-hoc teams chartered by the Program Areas to conduct information quality improvement and/or data correction efforts. Each Program Area may charter one or more teams as required for a specific Program Area project. These teams should include information producers and subject matter experts who understand the intended use of the data across the enterprise from initial creation to final disposal. Individuals may be members of both teams. Team members should be aware of all known and accepted data values for a data element as well as the environment in which the data is captured. Under the discretion and direction of the Program Areas, these teams may also conduct internal assessments of Program Area critical information.

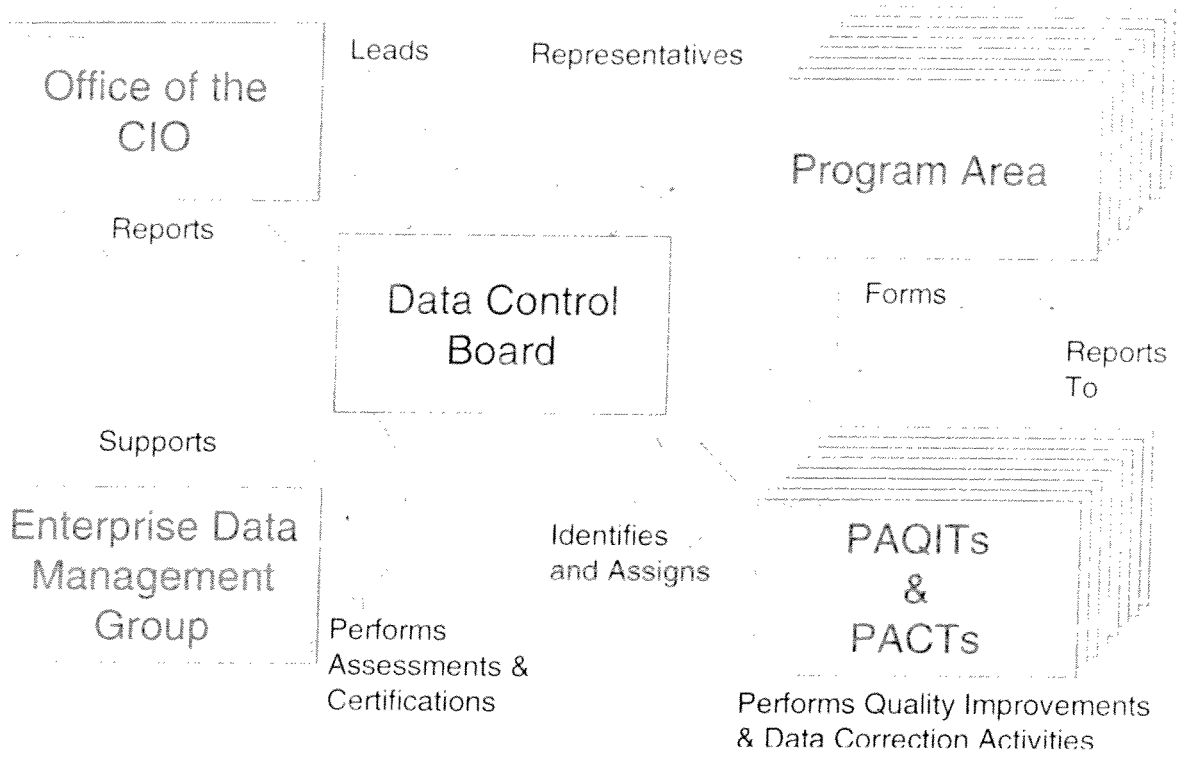

Figure 1.2: HUD's Information Quality Organization

1-6 HUD TIQM® Overview

A. To assist the Department with its strategy to implement Total Information Quality Management, this Handbook includes the steps to

1. Identify, prioritize, and assess areas of opportunity,
2. Determine the most effective approach to improve processes to ensure that defective data is no longer produced,
3. Correct the existing defective data,
4. Certify that the process and the information are in compliance with expected levels of quality or quality standards.

B. The TIQM® approach, shown in Figure 1.3, is based upon accepted industry standards and incorporates project management and total quality management principles. The method is iterative and may be repeated until the information reaches the appropriate quality levels. The following is a summary of each of the steps described in this Handbook; the numbers correspond to the chapters where the topic is presented in detail.

1. **Implementing HUD's Total Information Quality Management Environment**. Chapter 1 focuses on the systemic aspects that must be addressed within HUD to establish the proper environment for the successful deployment of a continuous information quality improvement.
2. **Assessment**. Chapter 2 focuses on the assessment of the state of information quality. The EDMG will execute this process in the assessment of mission-critical information. Program Areas may apply these processes to internal data elements that are important to their functions and responsibilities. Assessment consists of selecting the information group candidates based on impact and priority, assessing the data definition and information architecture quality, determining the desired quality standards, assessing the current level of

information quality, measuring the non-quality information costs, and interpreting and reporting the state of information quality. The outcome of the assessment, as a part of the final report, is a set of recommended follow-on actions for OCIO and the Program Area with which both concur. The Data Control Board is accountable for reviewing and accepting final assessment reports.

3. **Improvement**. Once the assessment has identified areas of improvement, the Program Areas shall initiate activities to improve the quality of the information they acquire or produce. This is a proactive effort to prevent the incidence of defects in the data by attacking the causes of non-quality information. Improvement consists of selecting the process for information quality improvement, developing a plan for improvement, implementing the improvement in a controlled environment, checking of the impact of the improvement to make sure that results are as expected, and standardizing the improvement across the enterprise.

4. **Correction**. Once the assessment has identified areas of correction, the Program Areas shall initiate activities to correct the quality of the information they acquire or produce. This is a reactive, one-time effort to eliminate existing defects in the data and should be taken as a complementary action to the improvement of the producing processes. Correction consists of planning the data correction, extracting and analyzing the data, executing manual and automated data corrections, and determining the effectiveness of the correction process.

5. **Certification**. As soon as Program Areas complete improvement and corrections efforts as described above, the EDMG independently verifies that the measures undertaken have accomplished the stated goals for mission-critical information. Certification consists of the certification of information quality improvements and/or the certification of data corrections. The objective is two–fold: first to ensure that mission-critical information is held to the agreed upon standards; and second, to ensure that the processes and procedures for improvement and correction are themselves improved over time for more effective and efficient results for HUD.

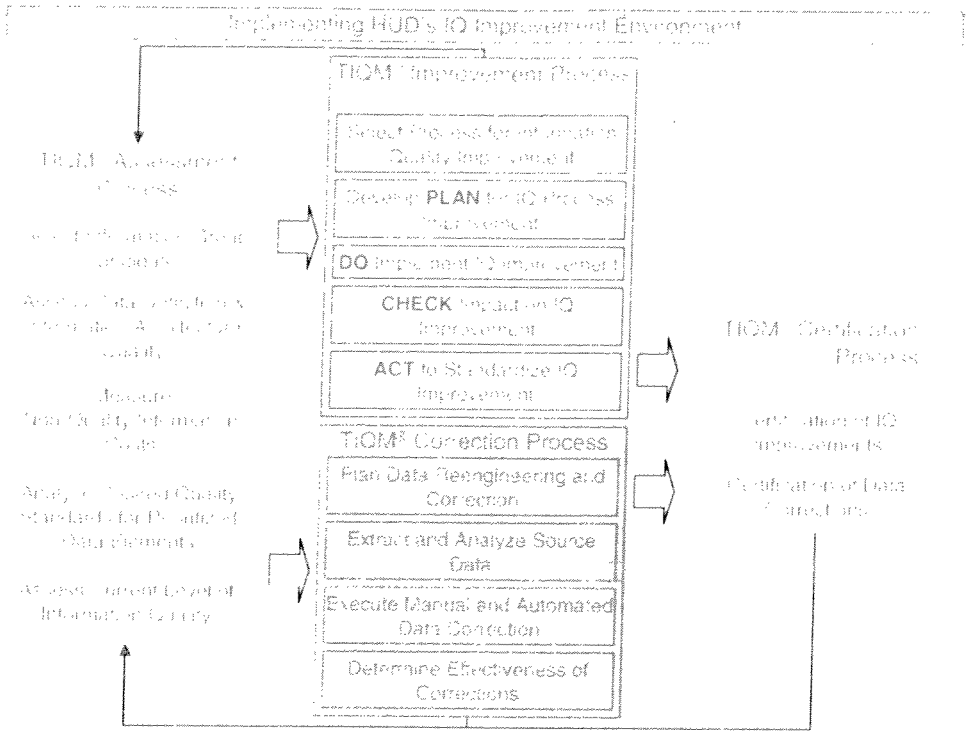

Figure 1.3: HUD's Total Information Quality Management Method